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Metis Hub: The Development of an Intuitive Project Planning System

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Metis Hub: The Development of an Intuitive Project Planning System

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Abstract

Before any project begins, planning must be done. Cost estimations are made, different scenarios are considered, and based on the results, a decision is made about whether to go forward with the project or not. The Environmental Restoration Department has a planning system, Phoenix, but it has existed for 20 years and is no longer meeting all needs. The institution has a cost estimation tool, Lab Pricer, but it also has room for improvement and is not secure. Metis Planning System, a new system, will combine Phoenix and Lab Pricer, and add additional capabilities to create an all-inclusive project planning system.

The goal is to develop an intuitive, dynamic, and consistent interface for the Metis Planning System by combining user requirements and human engineering concepts. The system is largely based upon existing systems so some tools already have working models that we can follow. However, the web-based interface is completely new.

My initial efforts on building the new Metis system began with becoming familiar with the project itself and the technologies used. Metis will be a web-based system, developed in Python with a Django framework. I attended many meetings where I was able to gather user requirements and meet the people involved. Only then did I create an initial design for the interface. Next I began the iterative process of getting feedback and amending my design based on that feedback. Our weekly meetings include people from several areas of the Lab so we are able to weigh everyone's varying opinions and make a decision that is the best choice for the majority. We made comparisons between our output and the output of our working models to ensure that we were doing calculations right and outputting the data correctly.

We have found that there are many benefits to this new system. The web-based platform allows for more security, as users will login using a username and password. In addition, files will be stored in a centralized location, and the clean user interface provides an intuitive user experience. People from many areas of the Lab have attended meetings and demos of the system and there is a lot of interest.

Metis development is progressing at a quick pace and the Metis Hub is the entrance to it all. The ability of the Hub to be easily understood by all user groups is extremely important to the effectiveness of the system

Introduction

The Lawrence Livermore National Laboratory spends a lot of time planning for projects and creating estimates to model different scenarios and situations that could take place. Even with so much time spent on planning, there is no central planning system. Each area of the Laboratory has separate ways of creating their estimates and plans. Some areas use a lab-wide cost estimation tool as a part of their planning, but it is used along with their own tools. The Environmental Restoration Department (ERD) has worked in the same way for many years. ERD has its own planning tool, Phoenix, which is used along with the Lab's cost estimation tool, Lab Pricer. Using two separate tools to complete one task can cause it to be more complicated than is necessary. Calculations and estimations created in Lab Pricer must be imported into Phoenix.

ERD reviewed its planning process and realized that there were several things missing and many areas that could be improved upon to make it a much easier process. Phoenix has been around for 20 years and Lab Pricer has been used for nearly 15 years. The idea came for the creation of a new planning system. This planning system would be web-based (unlike Phoenix and Lab Pricer) and would include all tools necessary for the project planning cycle.

My task this summer has been to develop the user interface, navigational framework, and several of the planning tools for Metis. The goal is to combine user requirements and human engineering concepts to produce a system that is entirely intuitive, dynamic, and consistent throughout.

Although this system is currently being developed in ERD, the needs of the entire Laboratory are taken into consideration at all steps along the way. Ultimately, this could become a system used across the entire institution.

Methods

There was a strong learning curve at the beginning of my internship. I needed to learn about the project itself, how each of the current planning systems work, the user requirements, the technologies used in development, and more. Having a clear understanding of these areas was crucial.

The first step was to gain understanding of Metis and the current planning systems, Phoenix and Lab Pricer. To learn about Metis, I attended many meetings with the team and was shown demos of the current development. I was also shown small demos of Lab Pricer and Phoenix.

In order to develop an interface that met all user needs, it was necessary to establish and understand user requirements. We are developing in an agile environment and we realize that requirements are continuously updating and changing. "It [requirements analysis] does not last for a set number of weeks or months and then finish. In practice, requirements evolve and develop as the stakeholders interact with designs and see what is possible and how certain facilities can help them"[1]. I learned about the major user requirements upfront, but that was not the end of the user requirements process. It is a constant process that we take part in to ensure that our designs are always improving.

I also needed to learn about the technologies used on the project. Metis is developed in Python with a Django framework. It uses an Oracle database in the back-end. The front-end is created through HTML5, CSS3, JavaScript, jQuery, and several outside vendor libraries. Python was a completely new language to me, so I spent some time going through Django tutorials to get an idea of how the model-view-controller (MVC) structure worked.

Initial Hub Development

Once I gained enough knowledge of the current situation, I was able to begin creating mock-ups of the Metis Hub (Figure 1). I was given little direction, so I was free to be creative and come up with several ideas that I thought might work. After the first mock-ups were created, I went through several iterations of meeting with stakeholders to get their feedback on the page content and design, and amending my work based on the feedback and user requirement changes.

JavaScript and jQuery, along with AJAX, were used to make the user experience quick and dynamic. Using these tools, “the browser can provide users with a more natural browsing experience”[2]. JavaScript is used in nearly every dynamic web interface today, and jQuery is the most popular JavaScript library with a usage rate of 65.4% of all websites [3]. JQuery also “has an extensible plugin architecture allowing developers to create reusable ‘widgets’ that can be plugged into any web application. This allows developers to quickly develop feature-rich user interfaces”[4]. Using these languages and libraries has been vital in allowing us to provide a high level of user experience.

Benefits of Metis

One method that is new and improved from other systems is that the Metis Planning System is a web application. There are many reasons why this is the best option for this system. It provides a level of security because users need to login with a username and password in order to access the website. Another benefit is that estimates can be saved in one centralized location and sorted based on many variables. This makes it easy for users to keep track of the estimates that they own, and estimates that have been shared with them. A third benefit is that the system can be accessed whether a user is on a Mac or PC. The system is developed to work on the main browsers: Firefox, Chrome, and Safari. The system will also be highly deployable. More users are able to access web-based systems and updates to the system can be made easily. Lastly, the website is designed to be dynamic and have the ability to be used on different sized screens.

Metis Lifecycle

The Metis project will be delivered in multiple phases with different areas of the system completed during each phase. We have managed to stick to the plan and we are even ahead of the plan in some areas. Since we are developing in an agile environment, we have been flexible with the many unexpected things that have come up, and we have incorporated them into the plan.

Testing

There were two main ways that we measured and tested our progress. First, we used the weekly meeting with stakeholders and users. In these meetings, we were able to show our progress on the system and get feedback. This was a great

form of acceptance testing. The meetings typically included people from several different areas of the Lab so there was representation from different departments. Second, we were able to make comparisons between our output and the output from our working models. One example is with the single person estimate page (Figure 3). This page calculates how much a person would cost to use him or her on your project and breaks the cost down by where each dollar goes. It is equivalent to a tab in Lab Pricer, so we are able to compare our single person estimate output to Lab Pricers'. These comparisons were vital to ensuring that we were doing calculations correctly and displaying data in the right way.

Results

Currently, much of the Hub menu is functional and has helpful capabilities. The Estimates page (Figure 2) displays a list of all saved estimates that the logged-in user has created. These estimates could be in any stage of the planning process, from early draft stage to being institutionally approved. Estimates can be sorted based on the name, the date last modified, the status, or by the name of the user who created the estimate. From this page, you can start a new estimate, view or edit an old estimate, delete an estimate that you created, or share an estimate with another user. I have created the Rates page (Figure 4), which shows the different rates that can be applied, broken down by year and even further by month. This view is a quick look-up that is useful for users to quickly see information about a specific rate, or see how a rate has changed over the years. Clicking on the rate name gives the

rates' full name, a description, an explanation of how it's applied and an explanation of what it supports. There is also a dropdown menu, which gives users the option to view the past and current years' data, as well as a list of rates for all years with a single rate value per year per category. The Single Person Estimate page is also fully functional. The single person estimate allows a user to enter an employee name, year, project number and task number, and view how much the employee will cost for that specific project. The cost is broken down to the lowest level (hourly), showing what specific burdens are applied. The Calendar page is another important aspect of planning. The calendar lists events such as holidays, payroll dates, and fiscal month start and end dates. It is essential to have quick access to this because it is taken into account for planning.

The Hub has gone through many iterations to get to its' current state. Changes have been made with the color scheme, the images used, the image placement, the number of buttons, and more. The current design has received positive reviews and we are happy with how it meets our goal of a consistent and intuitive interface.

Discussion and Conclusions

Metis development is progressing at a quick pace and the Metis Hub is the entrance to it all. The usefulness of the Hub is crucial to the effectiveness of the system. My work has already been through many iterations and I have no doubt that

many more changes will be made. Every change made moves us closer to the goal of an intuitive, consistent, and dynamic system.

As we advance forward with our work on Metis, we will be sure to continue including users and stakeholders as often as possible. “Involving users in the design process helps with expectation management and feelings of ownership, but how and when to involve users is a matter of dispute”[1]. Users and stakeholders should be included often because they can provide valuable feedback and opinions, but not so often that the constant feedback inhibits the ability to continue making progress.

There are still many features yet to be implemented in the system but we have made great strides so far and have received positive feedback from those who have viewed the system in its early stages. Several features still to be added include graphing capabilities for estimates and approved plans, import and export capabilities from other programs, and resource leveling. It is promising to have working models of many of the features we would like to implement, because this shows that not only are the features possible to implement, but we have a model to test our code against.

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Figures

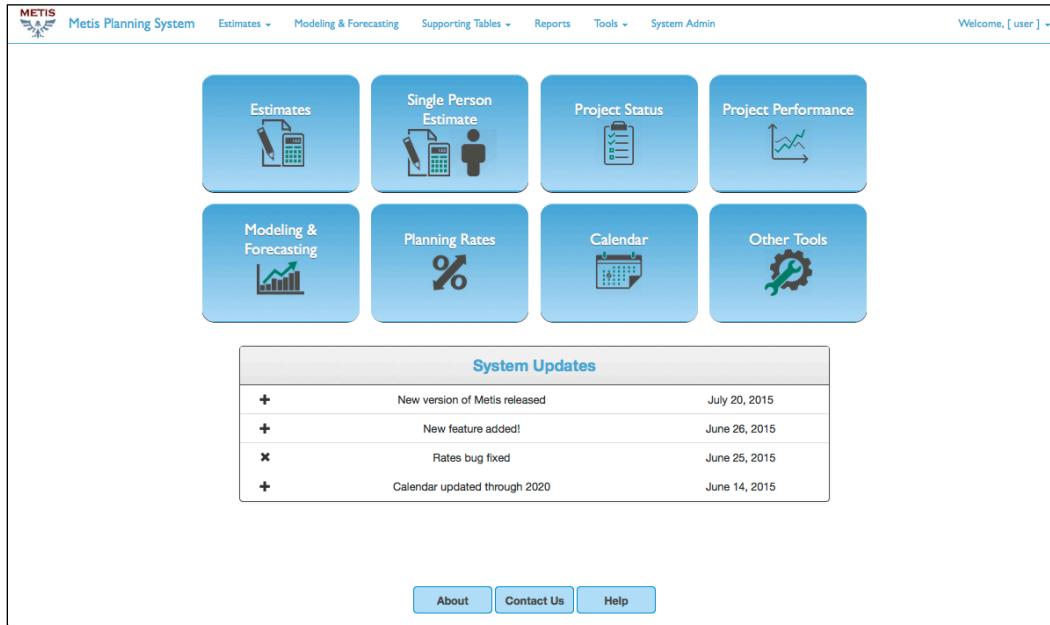


Figure 1. Metis Hub – the landing page for the Metis Planning System

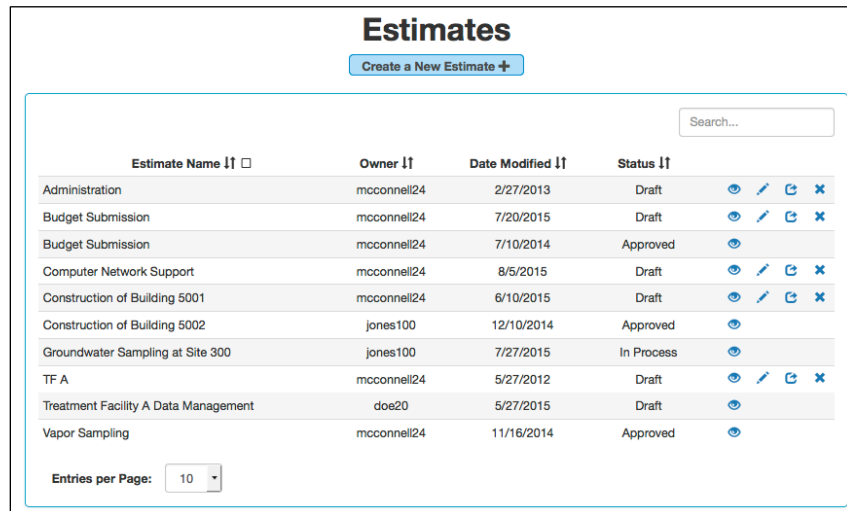


Figure 2. Estimates page – Displays a list of the users' estimates

Single Person Estimate

Enter the following information and the data will fill in below.

Employee ID/Name:

Year: Project #:

Time Type: Task #:

Employee Information >

Employee Estimate Breakdown >

	Rate	Hourly	Daily	Weekly	Monthly	Yearly
Standard Salary	\$80.88	\$80.88	\$647.00	\$3,235.02	\$14,126.27	\$169,515.26
Effort Factor	0.8433	\$68.20	\$545.62	\$2,728.10	\$11,912.68	\$142,952.22
Payroll Burden	61.00%	\$41.60	\$332.83	\$1,664.14	\$7,266.74	\$87,200.85
Wage Expense Subtotal		\$109.81	\$878.45	\$4,392.23	\$19,179.42	\$230,153.07
Recharge (Hourly)	\$0.00					
Labor Total		\$109.81	\$878.45	\$4,392.23	\$19,179.42	\$230,153.07
GS PMC	8.40%	\$9.22	\$73.79	\$368.95	\$1,611.07	\$19,332.86
Site Support Std	49.80%	\$59.28	\$474.21	\$2,371.07	\$10,353.67	\$124,243.99
G & A Std	21.00%	\$37.44	\$299.55	\$1,497.77	\$6,540.27	\$78,483.28
LDRD	6.60%	\$14.24	\$113.92	\$569.58	\$2,487.17	\$29,846.07
Mgmt Fee DOE	3.30%	\$7.12	\$56.96	\$284.79	\$1,243.59	\$14,923.04
S + S	0.00%	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00
Total		\$237.11	\$1,896.88	\$9,484.40	\$41,415.19	\$496,982.31

Figure 3. Single Person Estimate page – shows information for an employee and a cost estimate breakdown

Planning Rates

[Edit](#)
[Print](#)
[Download](#)

Rates > Fiscal Year -

For more information about a specific rate, click on the rate name.

Rate Name	Fiscal Year 2015											
	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
PB-Full	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%	61.00%
PB-Post Docs	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%	40.00%
GS PMC	8.40%	8.40%	8.40%	8.40%	8.40%	8.40%	8.40%	8.40%	7.90%	7.90%	7.90%	7.90%
NIF PMC	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%	5.50%
STE PMC	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%	1.00%
WCI PMC	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	8.00%	7.70%	7.70%	7.70%	7.70%
S & S	6.70%	6.70%	6.70%	6.70%	6.70%	6.70%	6.70%	6.70%	7.20%	7.20%	7.20%	7.20%
G & A Std	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%	21.00%
LDRD	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%	6.60%
PB-Reduced	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%	9.00%
Site Sup Std	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%	49.80%
Mgmt Fee DOE	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	3.30%	3.20%	3.20%	3.20%	3.20%	3.20%
Mgmt Fee Non-DOE	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%	2.90%
Gen PMC	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%	5.00%

****Highlighted cell indicates a change in rate value from the previous month.

Figure 4. Rates page – Quick lookup page for past, current, and future rates

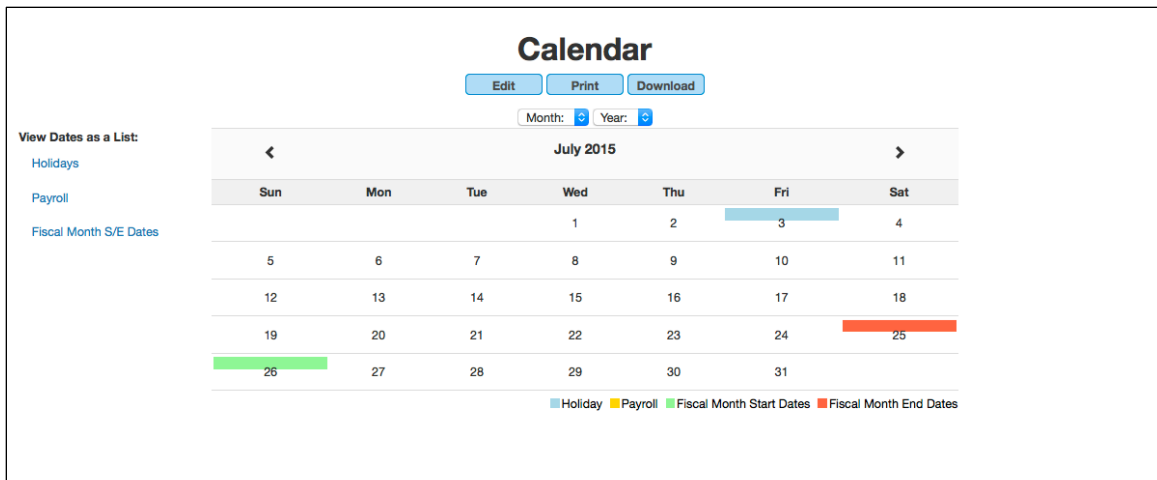


Figure 5. Calendar page – Displays holidays, payroll dates, and fiscal month start and end dates